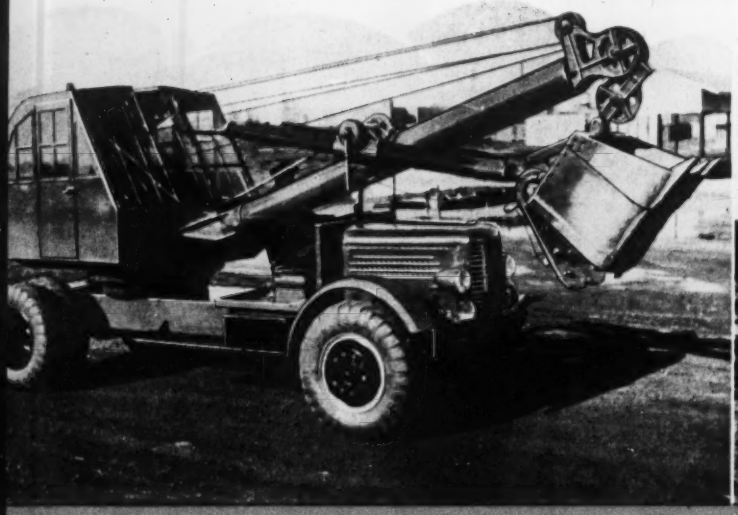
ENGINEERING NEWS-RECORD

Dual highway provides new outlet for New London — See page 4

Engineering Library

Cover More Jobs—



Michigan ⅜ yard convertible Truck Shovel.

Michigan ⅜ yard 4-Wheel Drive Truck Shovel.

Make More Money!

To Cover More Jobs takes highly mobile equipment. To Make More Money requires mobility *plus* dependable high speed operation ON-the-job. MICHIGAN Truck Shovel-Cranes give you both . . . 25 miles per hour, and more, on the highway—fast, full circle loading "on location"—fingertip air controls to step up production and keep it high all day long without tiring the operator. When the jobs at hand demand, the MICHIGAN can be changed in a jiffy from shovel to crane—to clam—to dragline—to trench hoe.

Bear in mind that MICHIGANS are *modern production machines*—designed and built from the ground up by one manufacturer. Pioneer in the Truck Crane and Truck Shovel field, MICHIGAN offers a complete line of ⅜ and ½ yard machines unequalled for operating speed and economy. MOBILITY is the watchword of the day on the construction front as well as on the battle front. MOBILITY plus CAPABILITY means more money for you in the end—that's the reason more and more men are saying "make mine a MICHIGAN!"

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MICHIGAN POWER SHOVEL COMPANY **BENTON HARBOR, MICHIGAN, U.S.A.**

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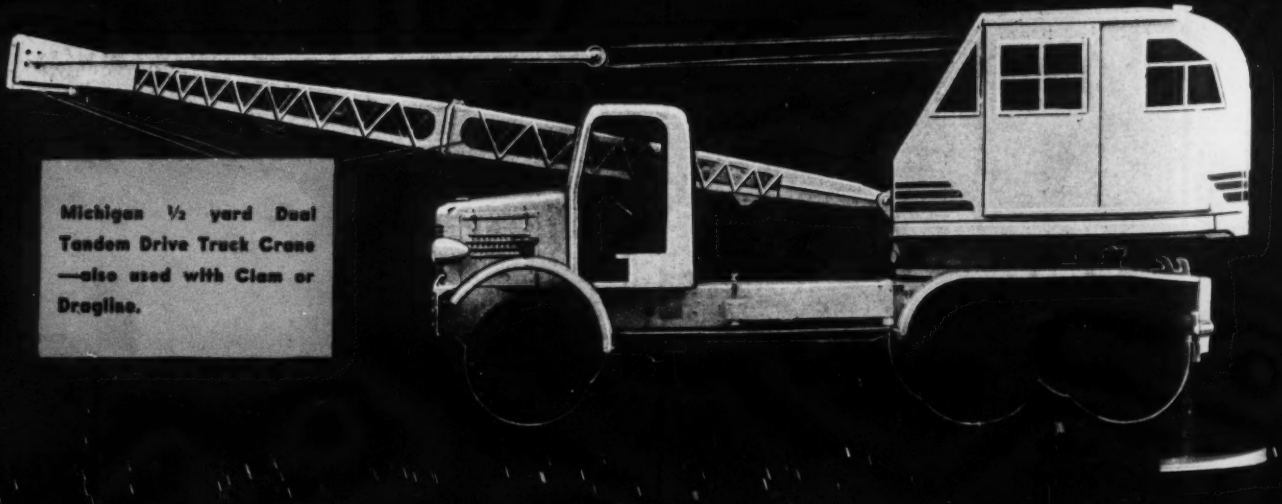


Michigan ½ yard Dual Tandem Drive Truck Crane —also used with Clam or Dragline.

The Week In Engineering and Construction

ENGINEERING NEWS-RECORD • AUGUST 22, 1940

Awarding of army contracts for defense plants begins

Construction contracted for this week includes a $20,000,000 tank plant, a $25,000,000 powder factory, and a $6,165,000 depot

The Army has opened the flood gates on its billion dollar construction program, it appeared this week following announcement of construction plans for a $20,000,000 military tank plant; a second $25,000,000 smokeless powder plant; a $6,165,000 general depot and other construction jobs, including a $3,500,000 award for temporary housing.

These announcements marked the arrival of the War Department program, which had lagged far behind the Navy and Air Corps construction programs.

The military tank plant will be built and operated by the Chrysler Corp. for the mass production of this vital military weapon. The building will cover approximately 800,000 sq.ft. on a 113-acre site already under option in the Detroit area.

Plans call for completion of the project within 13 months and employment of from 4,000 to 5,000 men for initial production. The plant will embody the most modern practice in tool and machinery design, in lay-out and in plant and production engineering, and will be adapted to ready expansion.

The new powder plant will be built and operated by the Hercules Powder Co., on a 2,500-acre tract near Radford, Va., 45 miles southwest of Roanoke. Construction is beginning immediately and is slated to be finished within 10 months. A force of 5,000 men will be employed on construction, and half that number will be employed for operation, after construction is completed.

Many plants planned

The Radford plant is the second to be undertaken by the Army, the first being under construction at Jeffersonville, Ind., across the Ohio River from Louisville, Ky. These are but the first two of a number of similar plants contemplated under the Army program for the creation of five integrated and self-contained ammunition-producing districts into which the interior of the country has been divided. The Radford plant is the smokeless powder unit for Area B, and the Louisville plant the unit for Area C.

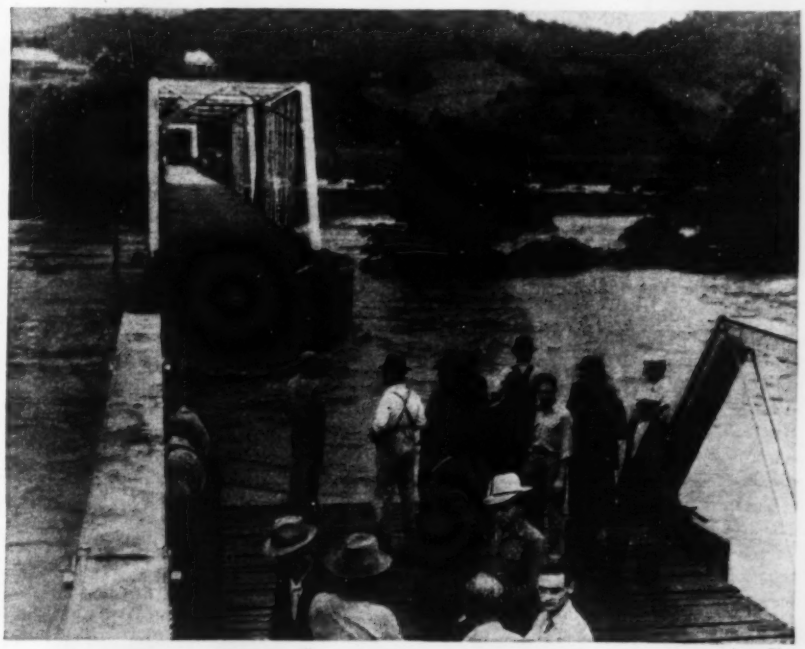
Cost plus fixed fee contracts

The tank plant and both the powder plants are being undertaken under cost plus fixed fee contracts. On the tank plant, for example, Chrysler Corp. will procure the site, build and equip the plant, and transfer title to the government, which will reimburse the corporation for all costs. Then the corporation will lease the plant during the contract period for $1.00 a year, operate and maintain it and build tanks at a fixed price per tank according to army designs.

This contractual arrangement is the method to be used by the War Department in providing armaments for which there is no normal peacetime demand. It is expected to be followed, with minor variations, in spending the rest of the $244,000,000 which has already been appropriated for similar purposes, and the $700,000,000 additional which is carried in the pending Second Deficiency Supplemental national defense appropriation bill.

Depot in Utah

The Army's new general depot will be located near Ogden, Utah, on a 1,617-acre tract of land, and will consist of a series of single-story warehouses for Chemical Warfare Service, Engineer



Acme Photo

One of many bridges damaged by southeastern floods

Rains from the tropical hurricane that swept in over the southeastern states last week fell heavily in the valley of the Watauga River on the western slope of the Blue Ridge Mountains, a tributary of the Tennessee River, sending that stream over its banks. This bridge is at Elizabethton, Tenn. For more details of the storm see p. 7.

Corps, Medical Corps, Signal Corps and Quartermaster Corps, as well as administrative and operating buildings, utilities and railroad facilities. The sum of $1,665,000 is already available for start of construction, and expenditure of an additional $4,500,000 is contemplated. The depot will serve army units from the Pacific coast to the Middle West.

First temporary housing contracts

Award of contracts covering construction of temporary housing at Fort Knox, Ky. and Camp Jackson, S.C., marked inauguration of the drive to house the expanded personnel of the service. The structures to be erected are mobilization type two-story buildings designed to bunk 60 men each. Kitchen and mess hall are in separate one-story buildings.

Such temporary housing will be of wood construction and similar to that thrown up during World War days. Before award of the Fort Knox and Camp Jackson contracts, temporary housing had been recently erected at Fort Benning, Ga., and Arlington, Virginia.

Struck Construction Co., Louisville, received the contract of $1,159,000 for Fort Knox housing and J. A. Jones Construction Co., Charlotte, N. C. the award of $2,193,000 for the Camp Jackson housing.

Also announced were contracts for nearly $6,000,000 of additions to Edgewood Arsenal of the Chemical Warfare Service and to the Aberdeen, Md., proving grounds. The Edgewood work—contract for which went to Whitman, Requardt and Smith, Cummins Construction Corporation, and Riggs Distler and Co., Inc., all of Baltimore—calls for construction of six chemical plants and additions to two mixing plants. Also involved is construction of a research laboratory, powder magazine, storage vaults and various utility extensions. At Aberdeen, various warehouses and shops, are also to be built.

More naval bases

Meanwhile, the Navy Department pushed ahead with its construction program, announcing award of an $18,012,500 contract for a new fleet operating base at San Pedro, California, and revealing $10,000,000 plans for establishment of three new naval reserve aviation bases, and the enlargement of 13 existing reserve bases throughout the country.

The new fleet operating base will cover 333 acres on Terminal Island, and involves dredging and filling, and construction of a breakwater, docking facilities and various repair and machine shops. The contract was awarded jointly to Guy F. Atkinson Co., San Francisco, and George Pollock, Sacramento, on a cost plus fixed fee basis.

New naval reserve airbases will be established near the New Orleans municipal airport; near Love Field, Dallas, the municipal airport, and on the old Camp Gordon Reservation, Atlanta. Details of the construction involved on these fields and on the expansion of facilities at the 13 existing bases are not yet available.

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New set-up proposed for defense housing

When the House-approved supplemental Defense Appropriations bill is called up for debate in the Senate, Senator Wagner of New York will offer an amendment appropriating $100,000,000 to the army and the navy to build temporary housing "in localities where President Roosevelt determines that there is an acute shortage of housing."

Under a bill introduced by the New York senator some time ago, $300,000,000 would have been appropriated for this purpose, and the United States Housing Authority would have been designated as the agency to do the work. Under the revised Wagner proposal, however, the USHA is squeezed out of the defense housing field, which is reserved to the army and navy.

Navy officials testified, during hearings in the Senate, that there was an immediate need for 50,000 defense housing units, to cost an estimated $3,000 per unit.

Federation program lists new sewage developments

Highlighting the technical sessions of the first annual convention of the Federation of Sewage Works Associations, which will be held in Chicago on Oct. 3-5, will be a group of papers outlining current developments in sewage treatment practice. Among the subjects regarding which new information will be presented are: industrial waste disposal, activated-sludge plant operation, chemical treatment methods and sludge conditioning. An important report will also be presented at this meeting concerned with the formation of a more integrated and active association than at present exists.

The registration fee for the three-day meeting, which is planned especially for the participation of plant operators, will be $3 and will include tickets for a smoker, the banquet and an inspection trip.

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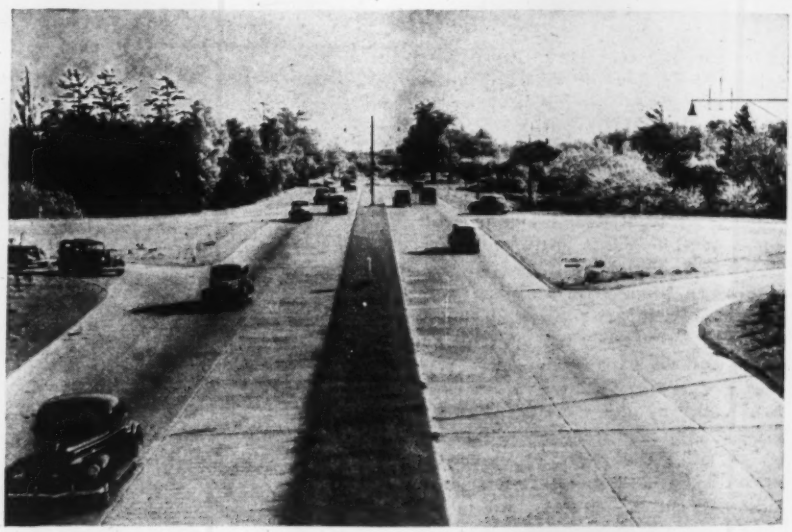
New Jersey cuts funds for WPA road work

Due to a shortage of men for WPA road construction work, New Jersey has stopped earmarking of funds for WPA highway projects and has transferred $4,100,000 from relief funds to the gen-



Long section of Canada's first express road opened

Aug. 23 the 73-mile section between Toronto and Niagara Falls of the Queen Elizabeth Way, Canada's first dual-lane express highway extending from Toronto to Fort Erie, Ont. (opposite Buffalo, N. Y.), was placed in service. With grading and bridge work complete, the remaining 18 miles from Niagara Falls to Fort Erie may be ready late this year.

No intersections at grade, a 300-ft. right of way, and 23-ft. roadways are features of the project. None of the highway's 23 curves are greater than 2 degrees. Grades have been limited to 3 per cent.

The Ontario Department of Highways with R. M. Smith, civil engineer, acting as deputy minister is doing the work, which is estimated to cost $120,000 per mile.

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eral construction funds of the state highway department.

James Logan, state highway engineer, sees it as a good omen that men are no longer in need of WPA help. Logan states that the department has not abandoned the WPA program but simply is removing the WPA earmark so that the funds can be used for the regular work of the state highway department and not, at this time, tied up in former types of projects.

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New York approves brick cavity-wall construction

Use of brick cavity-wall construction employing metal ties has been authorized in New York City through changes in the building code approved by the city council in July. Cavity-wall construction of this type has been used extensively in England for some time. It differs from the cavity-wall construction using brick ties that has been used in some parts of this country for many years in that metal ties are substituted for brick ties between the outer and inner faces of the wall. Walls are built of two sections, at least one brick thick, which are separated by an air space varying from 2 to 6 in. Ties of ¼-in. round Z-shaped steel rods, spaced not over 3 ft. apart horizontally and 16 in. vertically, are laid in the joints spanning the opening. The ties are galvanized or otherwise protected against corrosion. Use of the metal tie eliminates all transfer of moisture from the outer to the inner wall.

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Sewer trench slide kills three Indiana workmen

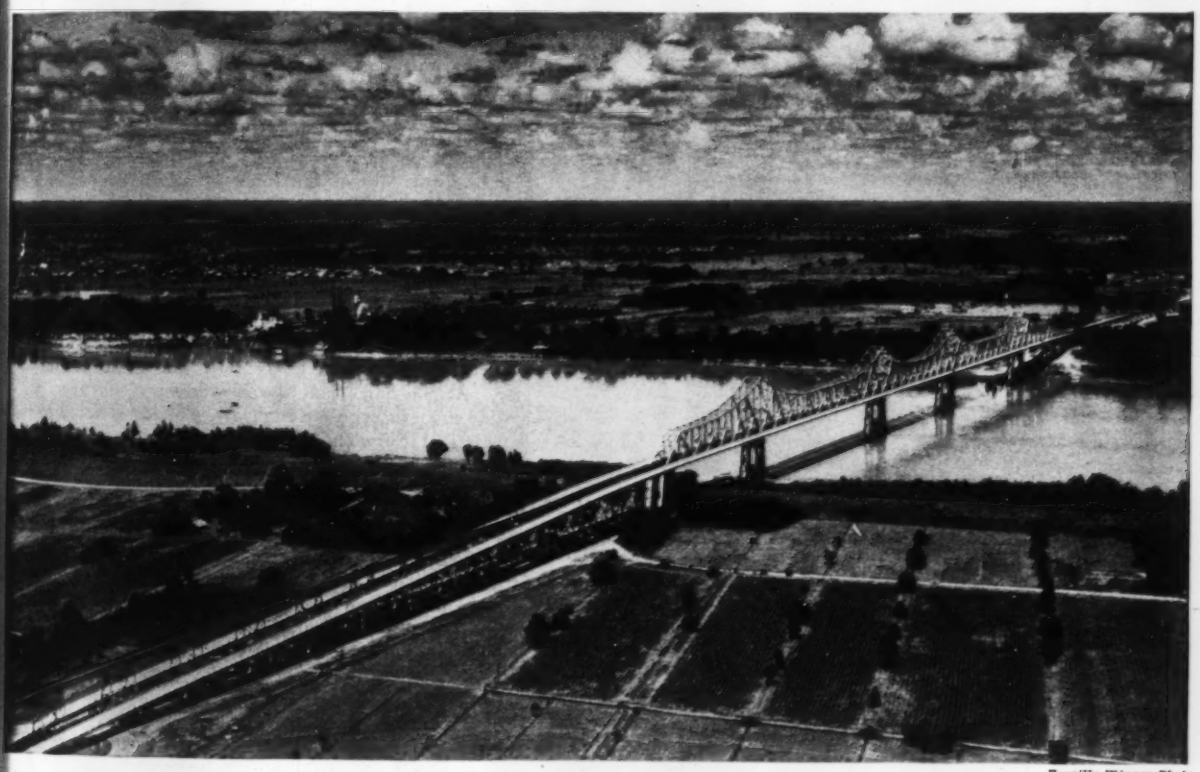
Three men, including Earl Dryden who held the subcontract for the work, were killed Aug. 14 at Lawrenceburg, Ind. when a slide occurred on a sewer trenching job. The men, working in a trench 12 ft. wide and 35 ft. deep without shoring, were buried under 12 ft. of earth.

Stevens Dam changed to rockfill with earth core

Stevens Dam on the White River near Seattle, Wash., is to be a dumped rockfill with an earth core instead of an earthfill. This was not clearly stated in the news report concerning this dam published last week.

This structure, known originally as Mud Mountain Dam, is to be 425 ft. high in a narrow gorge. It was to have been built of rolled glacial till, but when the borrowpit was stripped and tested it was found that a small percentage of colloidal clay in the available material raised question as to the stability of the proposed structure. Under the changed design the core will be of rolled fill and the remainder of the structure will be of dumped rock.

The dam is being built under the direction of Col. B. C. Dunn, district engineer, U. S. Engineer Corps. The original contract with the Guy F. Atkinson Co. has been altered to cover the new work on a cost plus a fee basis.



Fonville Winans Photo

Baton Rouge Bridge placed in service

Providing for two 22-ft. roadways supported on brackets outside the trusses and for two railroad tracks in the space between trusses, the new bridge spanning the Mississippi River at Baton Rouge, La., was formally opened to traffic Aug. 10. Built by the Louisiana State Highway Department, the project required three years for construction and cost $9,500,000.

The cantilever structure totals 3,326 ft. in length with the central span 650 ft., the two adjoining spans 858 ft., and the two shore anchor spans 490 ft.

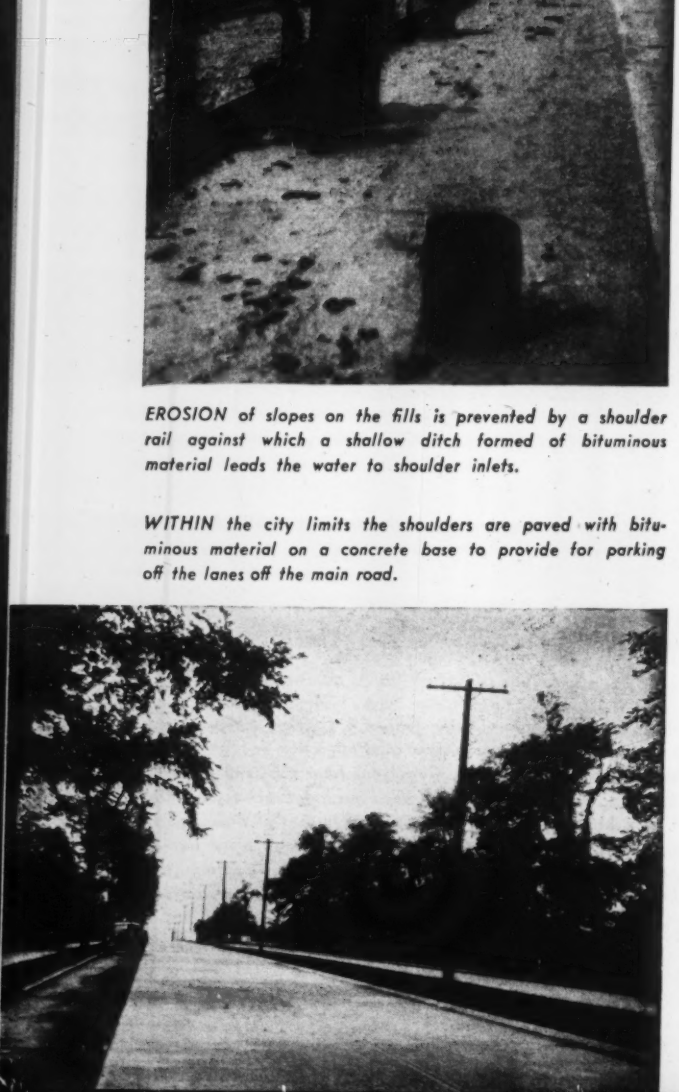
The Louisiana and Arkansas will pay $120,000 annually for use of the railroad tracks.

H. D. Henderlite is chief engineer and N. E. Lant bridge engineer for the highway commission. On the project E. L. Erickson represented the commission as construction engineer. Harrington & Cortelyou, Kansas City, Mo., were the consulting engineers. Bethlehem Steel Co. erected the superstructure; the Kansas City Bridge Co. built the main river piers; Uvalde Construction Co. the approach foundations; and Steel Const. Co. the approach superstructure.

THE NEW HIGHWAY north from New London, Conn., has four lanes separated by a wide median strip that ultimately will be planted with trees and shrubs.

EROSION of slopes on the fills is prevented by a shoulder rail against which a shallow ditch formed of bituminous material leads the water to shoulder inlets.

WITHIN the city limits the shoulders are paved with bituminous material on a concrete base to provide for parking off the lanes off the main road.

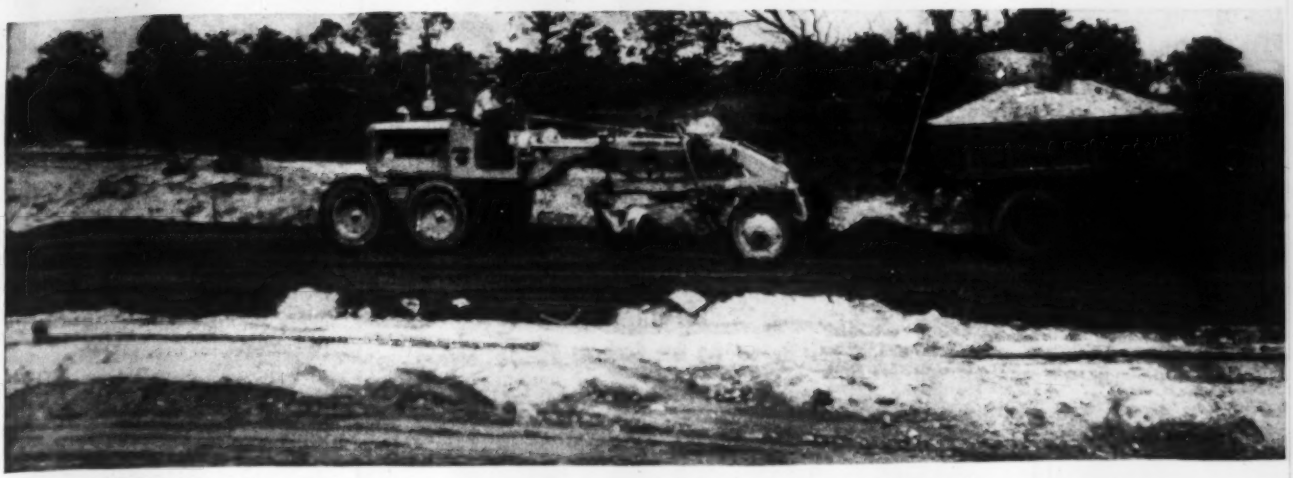


Dual highways improves

THE PRESENT MAIN ENTRANCE to New London, Conn., from the north is a narrow and crooked road with bad grade that is so built up as to practically preclude its improvement along the present location. It is now being replaced by 3½ miles of dual highway on a new location, which will be open to traffic some time this Fall. The new highway follows the route of an abandoned trolley line along the Thames River from New London to Norwich. It has only a few flat curves and no steep grades.

At the New London end a new entrance to the city is provided through Mohegan Ave., a wide street that has been repaved as part of the project. Connecting streets give easy access to the main highway along the coast, U. S. Route 1, without going down into the center of the city. At the north end the new highway connects with a wide modern concrete highway, extending north to the outskirts of Norwich.

The new highway is paved with four lanes of 8-in. reinforced concrete. Lane widths are 12 ft. for outer lanes, 10 ft. 7 in. for inner lanes. The median strip ranges in width from 14 to 20 ft. depending on local conditions. Shoulders are 8 ft. wide, of oiled gravel except within the city limits where the shoulder is paved with 2 in. of bituminous material on a concrete base to provide a parking area distinct from the highway proper. The center strip is to be seeded and ultimately will be planted with trees and shrubs by the roadside development department. All slopes in cuts and on fills are to be graded by the contractor for future loaming and seeding by the same department. An interesting detail of the roadway design is a shoulder rail of treated timber with a shallow bituminous ditch on all fills. The ditches drain to shoulder catchbasins.



GRAVEL for the sub-base is delivered by truck and is spread by a blade grader. The trucks are operated over the graded road to aid in consolidating the new materials.

ccess to New London

Curbs along the median strip are cast separate and doweled to the pavement.

The pavement is laid on a gravel base in all cuts, 12 in. deep in earth cuts and 24 in. deep rock cuts.

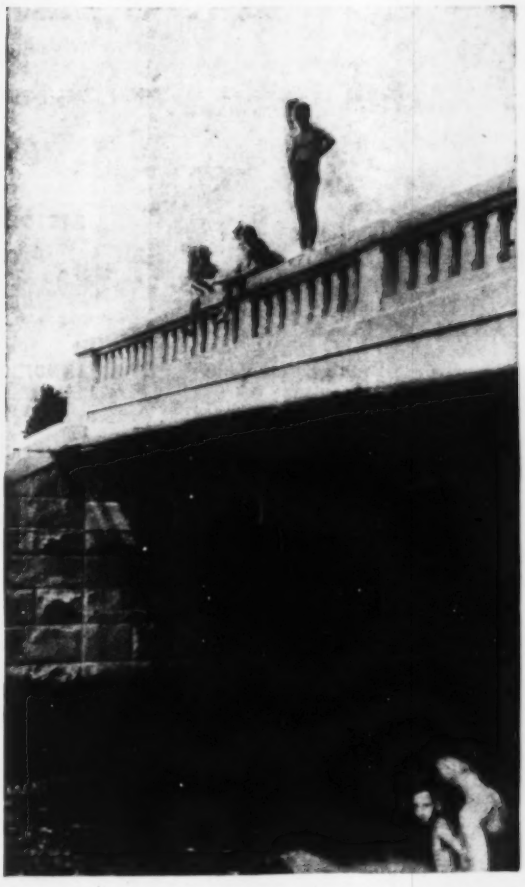
Only one bridge is involved in the project. It is a 50-ft. span concrete slab carried on steel I-beams encased in gunite. The deck is 80 ft. wide between parapets to include the full width of the pavements, median strip and the shoulders. Abutments are of ashlar-faced concrete carried on long wood piles.

The bridge is across Smith's cove, a deep tidal estuary off the Thames River. Because of the great depth of mud in the bottom the earth fill for the highway was built out across the cove to well beyond the site of the bridge before construction was started. This fill displaced the soft mud at the bridge site and eliminated the risk of earth movement due to filling around the bridge abutments that would have been involved in building the bridge first.

The job is divided into three contracts of about equal length. Paving on the two end contracts is completed and paving on the middle section, which includes the bridge over Smith Cove, has just begun. Contractors are Arute Bros. Inc., New Britain, Conn.; A. I. Savin Construction Co., East Hartford, and N. Benvenuti & Sons, New London.

The work is carried out by the Connecticut State Highway Department, William J. Cox, commissioner, E. C. Welden, deputy commissioner, M. A. Tyack, engineer of contracts and construction, and L. H. Beebe, resident engineer.

Shown on the cover of this issue is the temporary traffic circle in New London where the new route will take off from the old route.



THE BRIDGE over the channel into Smith Cove, while not a large structure, presented the contractor with a difficult problem in getting a tight coffer dam in the heavy fill dumped in to displace the deep mud in the Cove bottom. The boys of the neighborhood are urging the contractor to leave his working platform for their convenience.

George Gascoigne, sanitary consultant, dies

George B. Gascoigne, 55, consulting sanitary engineer of Cleveland, Ohio, died suddenly in that city on August 17. He had returned to his office just a week previous from a vacation on the Great Lakes where he had been recuperating from a nervous disorder.

Building his first sewage treatment plant in 1910, a $6,000 project at Wilberforce, Ohio, Gascoigne gradually rose to achieve a commanding position in the field of sanitary engineering. Up to the time of his death he had undertaken about $50,000,000 of work. One of his outstanding jobs was the design of sewage disposal facilities for Cleveland costing over $17,000,000. Just recently his organization was engaged to prepare plans for vast sewerage improvements in Philadelphia.

George Bradley Gascoigne

Prior to his graduation from Ohio State University in 1910, Gascoigne was employed in railroad surveying and bridge erection work. In November 1910 he became assistant city engineer of Sandusky, Ohio, and two years later he entered the employ of the city of Cleveland, remaining for ten years.

In 1922 Gascoigne opened his own office in Cleveland as a consultant. Another office was established in New York City in 1936 when he organized the firm of Gascoigne and Associates with W. L. Havens, C. A. Emerson, A. A. Burger, F. W. Jones and F. C. Tolles.

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First shaft contract let for Battery Tunnel

A contract for the first shafts for a vehicle tunnel from the Battery at the lower end of Manhattan Island to Brooklyn was let on Aug. 19 by the New York Tunnel Authority. The contract for $186,000 went to Angelino Capatano. It calls for two construction shafts to be sunk in Brooklyn, the work to start within a week and to be completed in six months.

Bids for a large construction shaft in New York are expected to be called in October.

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Panama Lock bids to be taken soon

The Panama Canal will advertise for bids within the near future for construction of the third set of locks, Bernard L. Burdick, chief of the Panama Canal's Washington office has announced. The only construction work done to date is dredging in the approach channels. However, the Panama Canal staff has about completed preparatory plans for the locks, and has assembled a force of 2,000 persons for the job of excavating for the new channels. The Army engineers will do most of the dry-land excavation work while the locks structures will be built under contract.

The canal administration is encountering difficulty in getting design engineers for the job. So serious was the bottleneck in the supply of engineers that Burdick dispatched a personnel expert to engineering colleges in search of graduates who could help design the three lock structures that will parallel the existing locks at Gatun, Pedro Miguel and Miraflores.

JOBS OF THE WEEK

PLANT FACILITIES, Edgewood and Aberdeen, Md.

Whitman, Requardt & Smith, Cummins Construction Co., and Riggs Distler Company, Inc., all of Baltimore, were awarded a $5,898,391 contract by the War Department for various plant facilities at Edgewood Arsenal and Aberdeen Proving Ground.

TEMPORARY BARRACKS AND WAREHOUSES at Fort Knox, Ky.

Struck Construction Co., Louisville, Ky., will construct 225 temporary buildings and warehouses at Fort Knox, Ky. under a $1,159,000 contract. The Constructing Quartermaster, Fort Knox, took bids on the work Aug. 12.

FACTORY, Endicott, N. Y.

Turner Construction Co., New York, N. Y., was awarded a contract by the International Business Machines Corp., Endicott, for constructing a 200,000-sq.ft. factory building. Estimated cost of the work is $1,500,000. John M. Demarest is the engineer.

LANDING FIELD PAVING, Seattle, Wash.

Warren Northwest Inc., Portland, Ore. will pave the landing field at Sand Point Naval Air Station in accordance with terms of a $546,298 contract. Estimated cost of the work is $600,298.

AIRPLANE FACTORY, Burbank, Calif.

H. W. Baum, Los Angeles, was awarded a contract for constructing a group of reinforced concrete manufacturing and assembly buildings for the Lockheed Aircraft Co., Burbank, Calif. Cost of the work is $1,500,000.

SEWERS, Corpus Christi, Tex.

Brown & Root, Inc., Corpus Christi, by terms of a $685,445 contract, will construct additional sewer and expand an existing disposal plant for the city of Corpus Christi, Texas for which J. C. Bissett is city engineer. Estimated cost of the work is $1,000,000.

SHIPWAY AND DRYDOCK, Newport News, Va.

Dravo Corp., Pittsburgh, Pa. received a contract from the Newport News Shipbuilding & Drydock Co., Newport News, Va. for constructing a combination shipway and drydock for aircraft carriers. Estimated cost of the work is $2,000,000.

TEMPORARY BARRACKS, Camp Jackson, S. C.

J. A. Jones Construction Co., Charlotte, N. C., will construct 402 temporary wooden buildings at Camp Jackson, S. C. for the Constructing Quartermaster, Atlanta, Ga. The bid of the Jones Construction firm was $2,193,000.

NOTE—Additional bidding and contract news on over 600 projects, large and small, appear in the Construction News Section beginning on page 13.

Tropical storm does wide damage in the southeastern states

Hurricane strikes Georgia-South Carolina coast and moving inland causes heavy damage to roads, railways and towns

A tropical hurricane that came in from the Atlantic Ocean between Savannah and Charleston on Aug. 11 caused extensive damage in the coast towns due to wind and high tides, moved across Georgia into western Tennessee and Kentucky and then turned east into the Blue Ridge Mountains, where very abnormal rainfalls caused heavy damage in western North Carolina and parts of Tennessee and Virginia. A week after it came in from the Atlantic the storm moved out to sea again over North Carolina.

High wind velocities

Savannah, Charleston and the shore resorts along the coast of Georgia and South Carolina suffered heavily from the winds which reached a velocity of 75 mph at Charleston and 68 mph at Savannah. Tides are said to have been the highest on record. Torrential rains accompanied the storm.

The Marine Barracks at Parris Island, S. C., were so badly damaged that new recruits are being sent to Quantico, Va., for the next two weeks.

Slight damage at Pinopolis Dam

No serious damage was done at the Santee-Cooper power and navigation project northwest of Charleston. At Pinopolis Dam it was necessary to breach the coffer-dam that turns a large creek into a conduit passing the powerhouse and lock, but little injury was done to the earthfill that was overtopped.

Sweeping northwest into the mountains the storm poured heavy rains on the headwaters of the Little Tennessee River and the French Broad River causing bad floods on all the tributaries. It also reached the valley of the Watauga, a tributary of Holston in the extreme west part of Tennessee, causing record floods there and doing much damage to Elizabethton.

High floods also were caused on the eastern slope of the mountains on tributaries of the Catawba and the Yadkin River, but these flood flows were largely absorbed in the reservoirs of the power companies and did little damage downstream. Lake James on the Catawba, a reservoir of the Duke Power Co., rose 10 ft. in as many hours, to a depth of 6.1 ft. over the spillway.

Moving northeast, the storm spent itself in the Roanoke River Valley in Virginia and northern North Carolina.

Serious road damage

Secondary roads in the mountain region suffered badly and many bridges were lost. Landslides were numerous, closing off roads and rail lines. Railroad and highway fills also were swept away at many points. No estimate of the extent or amount of the damage is yet available. Highway officials estimate that 90 per cent of the secondary road bridges in Ashe, Watauga, Wilkes and the northern part of Caldwell County in North Carolina were lost.

Damage to main roads was not so extensive, but was serious at many points and several bridges were damaged.

Railroads lost many embankments and were buried by landslides at numerous points. On the Southern Ry. between Asheville and Salisbury, a distance of about 140 miles, there were 13 slides, one being 33 ft. deep and 700 ft. long.

Towns suffer heavily

Towns in the narrow mountain valley suffered heavily from inundation and many houses were swept from their foundations by the mountain streams that overran their banks.

At Asheville, N. C., 100 ft. of the 24-in. watermain from the Bee Tree Reservoir was washed out as were two 16-in. mains on the North Fork, and the city was compelled to draw on its emergency supply for about 36 hours. Morganton, N. C., lost sections of its 13-mile supply line at three points and was on a very limited supply for many hours.

Heavy rainfall

With the record for six hours during the hurricane missing, the Weather Bureau reports 7.68 in. of rain as falling in Charleston on Aug. 12. Oven ten inches fell there in a three-day period. Other high total falls for the storm were 10.16 in. at Florence, S. C.; 7.22 at Augusta; 5.73 at Asheville; 14.20 on top of Mt. Mitchell, 20 miles north of Asheville, of which 6.60 in. fell on Aug. 14; 10.47 in. at Lynchburg, Va., and 9.02 at Roanoke. High 24-hr. records in addition to Charleston and Mt. Mitchell were made at Atlanta, Aug. 13, 4.97 in.; 3.66 at Greensboro, N. C., Aug. 14; 5.01 in. at Lynchburg; 4.27 in. at Roanoke; 4.12 at Raleigh and 6.05 at Florence on Aug. 15. Unofficial records give 6.10 in. at Morganton, most of which fell before midnight, Aug. 15.

Acme Photo

The Yadkin River went high over its banks in the whole mountain region. At Elkin, N. C., it flooded the railroad yards and a considerable part of the town.

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Penn Turnpike opening again delayed

Originally scheduled for Labor Day, the opening of the Pennsylvania Turnpike has now been postponed until sometime "before September 15" according to an official report. Originally the 160-mile project extending from Harrisburg to Pittsburgh was scheduled for dedication July 4, but later postponed to Labor Day (*ENR* June 20, 1940, p. 835).

One reason given for the new delay was the expected difficulty in accommodating the holiday crowd.

MEN AND JOBS

J. A. LEPRINCE, recently retired from the U.S. Public Health Service, has been named chief of party of a group of engineers, entomologists, and botanists to advise as to mosquito control for five states of the upper Mississippi Valley. The work is part of the upper Mississippi Sanitary agreement made several years ago between the five states of Minnesota, Wisconsin, Iowa, Missouri and Illinois; headquarters will be at Rock Island, Ill. LePrince who was associated with General Gorgas in the yellow fever and malarial control work in the Panama Canal Zone for ten years, was with the Public Health Service in charge of the malaria control division from 1914 until retiring last year. In his new work he will be aided by H. W. POSTON, assistant engineer with the Iowa State Department of Health, who is on a leave of absence from that body for the duration of the survey.

LAWRENCE SHARINGHOUSEN, civil engineering employee of the War Department on the Walla Walla flood-control project, has been named city engineer of Pendleton, Wash. RAY CORWIN has been named state commissioner of Pendleton, filling the vacancy left by the death of Alfa Peters, who had been with the city since 1922.

LIEUT. GERALD Q. THACKER, civil engineering corps, U. S. Naval Reserves, has also been ordered to report for active duty in the Fourteenth Naval District, Pearl Harbor, T. H. He has been stationed at Berkeley, Calif.

LIEUT. DOLE F. THOMSON, civil engineering corps, U. S. Naval Reserves, has been ordered to active duty in the Twelfth Naval District, San Francisco, Cal. Lieut. Thomson has been stationed at Palo Alto, Cal.

LIEUT. MAYNARD M. ANDERSON, civil engineering corps, U. S. Naval Reserves, now stationed at Los Angeles, Calif., has been ordered to active duty in the Twelfth Naval District, San Francisco, Calif.

LIEUT. EARL R. BENNETT, civil engineering corps, U. S. Naval Reserves, at Ballejo, Calif., has been ordered to report for active duty at the Naval Submarine Base, New London, Conn.

LLOYD MCNULTY, assistant city engineer of the city of South St. Paul, Minn., for some years, has been appointed acting city engineer to serve for the remainder of the term of W. H. CROPSEY, former city engineer who has been made superintendent of the new sewage disposal plant of that city. It was erroneously stated in *ENR* July 25 p. 128 that McNulty was assistant city engineer of St. Paul.

LIEUT. GEORGE W. GANS, civil engineering corps, U. S. Naval Reserves, has been transferred from Omaha, Nebr., to active duty at the U. S. Marine Barracks, Quantico, Va.

LIEUT. HARRY C. ROWE, civil engineering corps, U. S. Naval Reserves, has reported for duty at the Naval Air Station, Lakehurst, N. J. He had been stationed at Hayward, Calif.

LIEUT. CLARENCE E. SPELLMAN, civil engineering corps, U. S. Naval Reserves, has been ordered to report for active duty at the Bureau of Yards and Docks, Washington, D. C. Lieut. Spellman had been stationed at Hastings, Nebr.

ADALBERT DIEFENDORF, head of the department of civil engineering, School of Mines and Engineering, University of Utah, is giving a series of lectures on highway work at Mexico City for Mexican engineers. Diefendorf, member of the educational section of American Road Builders Association, was invited to lecture in the Mexican capital by the Military Communications and Public Works.

H. D. BOSSERT, graduate of Iowa State College, has been named field engineer for Iowa for the Structural Clay Products Institute, Ames, Ia. Formerly engineer in Nebraska for the institute, Bossert replaces M. H. ALLEN, whose new duties will be acting as field engineer in Minnesota.

LIEUT. EDWARD A. BROWN, JR., of the army engineering corps at the University of Iowa, has been transferred from Iowa City to Washington, D. C.

J. D. MACKAY, city engineer of Fredericton, N. B., has been given a leave of absence by the city council to join the engineering department of Military District No. 7 at St. John, N. B. Although assigned to army projects with the Royal Canadian Engineers, he will continue as a civilian. ELBRIDGE KEENAN, assistant engineer at Fredericton, will be acting engineer until the return of Mackay.

JOHN P. MCINERNEY, who as construction superintendent for the New York World's Fair supervised construction of all buildings on the fair grounds, including buildings of the exhibitors, has resigned to join Starrett Bros. & Eken, Inc., builders of New York City. Early in life McInerney joined the George A. Fuller Co., New York, remaining with them until shortly after the outbreak of the World War, when he resigned to enlist with the construction division of the air service. After the World War he returned to the Fuller Co., leaving in 1923 to supervise the erection of the publishing plant of the Detroit Free Press. From 1926-1929 he was employed on construction work by the Simon J. Murphy Co., Detroit. From 1929 to 1936 he supervised construction for the Empire State Building in New York. He joined the New York World's Fair in 1936. In his new work he will be with PAUL STARRETT, former president of the George A. Fuller Co., and A. J. EKEN, former vice-president of the Fuller firm, and RUSSELL HUNTER, once general superintendent of the Fuller Company.

MAJ. HARRY W. HILL, Gary, Ind., has been named active military assistant of the Rock Island, Ill., District, U. S. Engineers, according to COL. CHARLES P. GROSS, district engineer at Rock Island. Other changes in the Rock Island district include: JACK DIXON, head of the hydraulics section, joining the National Resources Planning Board at Washington, D. C.; ISRAEL E. BERGENBLIT, junior engineer, being transferred to Vicksburg, Miss.; HARRY F. JOHNSON, draftsman, transferred to Savannah, Ga.; RAYMOND SMITH, transferred to Denison, Tex.; and STEWART KUTTLER, junior engineer, ROBERT P. TEETS, surveyman, ROBERT E. IHM, sub-surveyman, and GORDON A. BLAIR, sub-surveyman, all to the Savanna, Ill., proving ground.

RICARDO L. VAZQUEZ, Mexican civil engineer, has accepted the invitation of the governments of Brazil and Colombia to visit those countries to inspect highway work initiated last year under his direction.

SCOTT E. WAY of Erie, Pa., has been appointed project engineer for the Franklin County district of the Pennsylvania State Highway Department.

JAMES W. MORRISON, district engineer for the WPA at Walla Walla, Wash., for the past four years, has been named district manager and district supervisor of operations with offices at Yakima, Wash.

COL. BEVERLY C. DUNN, who has been on duty at March Field, Calif., for the 28th Engineers, has been transferred to Seattle, Wash., as district engineer. He will temporarily succeed LIEUT. COL. L. E. ATKINS, who has held the post for the past year and is expected to return to it after a short time.

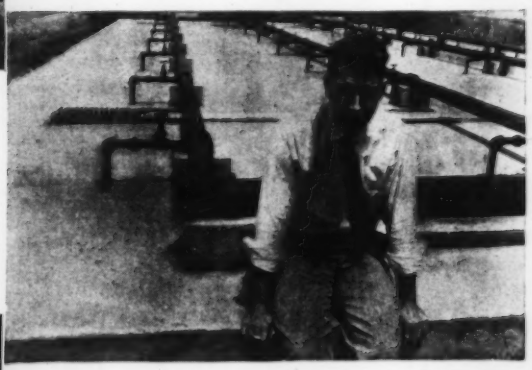
JAMES O. NEWCOMB of Boise, Idaho, has been appointed Idaho state commissioner of public works to succeed E. W. SINCLAIR, resigned. Newcomb has been engaged in mine construction work.

Men at Work

High above the Hudson River the Department of Public Works of the state of New York is relocating the highway that now runs through West Point. Shown above, right to left, are DANIEL W. BROWN, engineer in charge of the project and G. L. NICKERSON of the district engineer's staff, Department of Public Works; and ALBERT G. TIMMS and H. W. WILSON of the Portland Cement Association. A wide range of blended cements is being used on this job and the P.C.A. is assisting in the study.

No question but what these three fellows are really men at work. JOHN R. AUSTIN (left), ART STILES (center) and JOHN G. FARMER, superintendent, shift boss and engineer, respectively, for the Golden Cycle Corp. on the Carleton drainage tunnel at Cripple Creek, Colo., stopped work long enough to have this picture taken at the face of the heading 3½ mi. from the portal. Austin says this is the tunnel job he has been dreaming about for 40 years—a job direct for the owners, no inspectors to bother him and no worry about tight spots or overbreak, for the tunnel will be left unlined and will serve merely as drainage for some of the deep gold mines in the vicinity. He has operations clicking with the methodical precision of high speed railroad schedules. Stiles is a typical shift boss, for the editor found him grumbling to Austin about the condition of the tunnel as left by the previous shift boss and arguing with the engineer over credit for an additional 6 in. of progress for the previous day. Farmer broke into the tunneling game under Austin on the Colorado River Aqueduct. The Carleton job holds the world's record for driving a heading from a portal, 1,879 ft. having been driven in 31 days with a high daily record of 74 ft.

Caught in conference on the relocation of the Santa Fe R. R. around John Martin Dam at Caddoa, Colo. are left to right above: G. L. MERCER, engineer in charge of the project for the Santa Fe; HUBERT EVERIST, president of Western Contracting Corp., Sioux City, Ia., contractor on the project; and JOHN LEISNER, general grading superintendent for the contractor.



Details of operation of a new 35-mgd lime-and-soda softening addition at the Flint, Mich. water purification plant had just been given to the editor by F. J. MAHONEY (above), senior chemist, when this picture was taken. C. H. Burdick is plant superintendent and E. L. Holloway superintendent of waterworks.

W. E. SHULL, concrete superintendent for Thompson-Starrett Co., on the Ida B. Wells housing project in Chicago holds the unique distinction of being in charge of the only concrete job in the Chicago area where transit mixers are being used. The project covers a large area on Chicago's south side.

OBITUARY

HARRY S. R. MCCURDY, 64, chief engineer of the Philadelphia Suburban Water Co. for 13 years, died Aug. 13 at his home near Cynwyd. McCurdy once worked as division engineer with the New York Board of Water Supply to be in charge of construction of the Ashokan reservoir, with the Morgan Engineering Co., Dayton, Ohio, on flood control work as division engineer of the Miami (Ohio) Conservancy District, and as construction engineer on Philadelphia subways for Patrick McGovern, Inc.

PAUL M. KELLEY, 49, engineer who saw service in France during the World War with the 104th Engineers, died in New York City Aug. 10. Prior to the World War he was employed on the construction of the Hudson tubes and construction work with the Canadian Northern Ry.

J. J. LALONDE, civil engineer employed as flying officer with the Canadian air force, was killed near Dartmouth, Nova Scotia, on July 15 when his plane crashed into Halifax Harbor.

WILLIAM H. ESAU, 56, superintendent of steel erection at Chicago for the Bethlehem Steel Co., was killed Aug. 15 while directing construction of the new bridge at Central and Grand avenues in that city. Esau has supervised erection of many skyscrapers. Two of his recent jobs were the erection of administration building at the Chicago municipal airport and the new North Avenue Armory in Chicago.

JAMES A. ROGERS, 56, construction engineer of Omaha, Neb. who has been employed lately as a WPA superintendent, died recently at Omaha. At one time he was connected with the E. A. Wickham Construction Co., Omaha.

JOHN C. SANGSTER, for many years on the civil engineering staff of the Canadian National Ry. died recently at Toronto, Ont. Sangster joined the Canadian National at Moncton, N. B. to be transferred 15 years ago to Toronto.

JOSEPH WARTER, SR., paving contractor of Tacoma, Wash. was killed Aug. 6 in an automobile accident in California.

BENJAMIN L. CLARK, 54, manager of a waterworks at Camden, Ark. for the Arkansas Power & Light Co., died last week in that city. For 20 years Clark was stationed at Pine Bluff, Ark. while employed by Arkansas Power & Light.

HERMAN KRUSI, 82, who retired in 1910 after having founded the San Francisco Bridge Co. and later the Atlantic Gulf & Pacific Co., died at his home at Berkeley, Calif. Aug. 14. A civil engineering graduate of Cornell, he went to the West Coast early in life to engage in the design and construction of highway bridges.

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Bonneville-Grand Coulee power line complete

Completion, on Aug. 2, of the 235-mi. 230,000-volt transmission line connecting Bonneville and Grand Coulee Dams brings to 441 mi. the total length of the transmission line network now under direction of the Bonneville Power Administration. The network includes high tension lines extending from Bonneville to Vancouver, Wash., thence north and west to Raymond, Wash., and south to Eugene, Ore. The Washington Water Power Co. has tied its 110,000-v. system with the Bonneville line at a point where the two lines cross.

Construction on the line to Grand Coulee, which cost about $4,000,000 including right-of-way, was started Aug. 7, 1939 after about a year of surveys, studies and preparatory work.

CONTRACTS AND CAPITAL

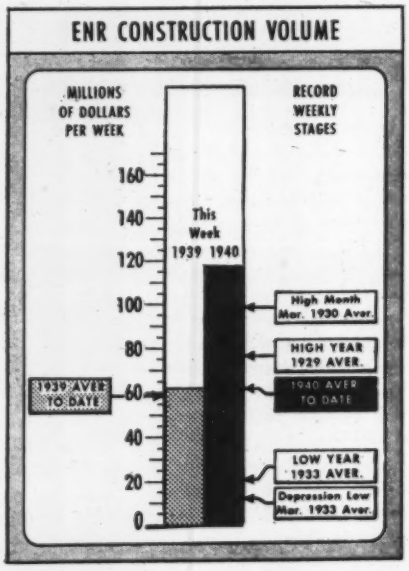
CONTINUED GOVERNMENT spending for military and naval defense projects brings the week's engineering construction volume to $128,449,000, the second highest weekly total of the year. It tops a week ago by 184 per cent, and exceeds the corresponding 1939 week by 109 per cent.

Awards for the smokeless powder plant in Radford, Va., the tank plant in Detroit, and the fleet operating base at San Pedro, Calif., brought public construction to $109,435,000, the second highest volume of the year, 292 per cent higher than a week ago, and 230 per cent above a year ago. Private construction tops last week by 9 per cent, but falls 33 per cent below the volume for last year.

The week's awards bring 1940 construction to $2,077,277,000, a level 4 per cent higher than in the 34-week period last year. Private awards are up 18 per cent compared with a year ago. Public construction, as a result of the 165 per cent increase in federal work, is now practically equal to the volume reported for 1939.

Public building construction for the week, $72,379,000, is at its second highest level of the year as a result of federal awards for defense plants. In addition to public buildings, sewerage, industrial buildings and unclassified construction top a week ago; and sewerage, industrial buildings, streets and roads and unclassified exceed their totals for the 1939 week.

New construction financing for the year to date, $1,989,925,000, is 7 per cent lower than the $2,137,541,000 reported for the 34-week period in 1939.



CONTRACTS

(Thousands of dollars)

	Week Ending Aug. 24 1939	Aug. 15 1940	Aug. 22 1940
Federal	$3,702	$7,597	$78,930
State & Municipal	29,500	19,944	29,369
Total public	$33,202	$27,541	$108,435
Total private	28,248	17,364	19,914
TOTALS	$61,450	$45,305	$128,449
Cumulative 1940	(34 weeks)		$2,077,277
1939	(34 weeks)		$1,988,906

Note: Minimum size projects included are: Waterworks and waterways projects, $15,000; other public works, $25,000; industrial building, $40,000; other buildings, $150,000.

NEW PRODUCTIVE CAPITAL

	1939 34 Wks.	Cumulative 1940 34 Wks.
NON-FEDERAL	$1,009,513	$1,181,533
Corp. Securities	163,506	172,556
State & Mun.	401,855	380,145
R.E.A. loans	89,445	.....
U.S.H.A. loans	160,852	118,561
R.F.C. loans	3,855	116,130
Fed. Air-Hwy.	190,000	184,000
FEDERAL	$1,128,028	$808,372
TOTAL CAPITAL	$2,137,541	$1,989,905

FHA MORTGAGES

	Week Ending Aug. 19 1939	Aug. 10 1940	Aug. 17 1940
Selected for appraisal	$23,689	$27,054	$28,471*
Cumulative 1940	(33 weeks)		$819,909*
1939	(33 weeks)		$744,682

* Subject to revision.

ENR INDEX NUMBERS

Index Base = 100		1913	1926
Construction Cost	Aug. '40	242.18	116.42
Building Cost	Aug. '40	201.71	106.04
Volume	July, '40	308	135

Armour and Lewis join to form new Illinois Tech

A new engineering school to be known as the Illinois Institute of Technology has been formed by the merger of Armour Institute of Technology and Lewis Institute at Chicago. James D. Cunningham, head of the board of Armour Institute, was named chairman of the new institution and Alex D. Bailey, chairman of the Lewis board, was elected vice-chairman. Henry T. Heald, 35-year-old president of Armour, will be president of the combined school. Articles of incorporation for Illinois Tech were filed July 24 by trustees of the two institutions.

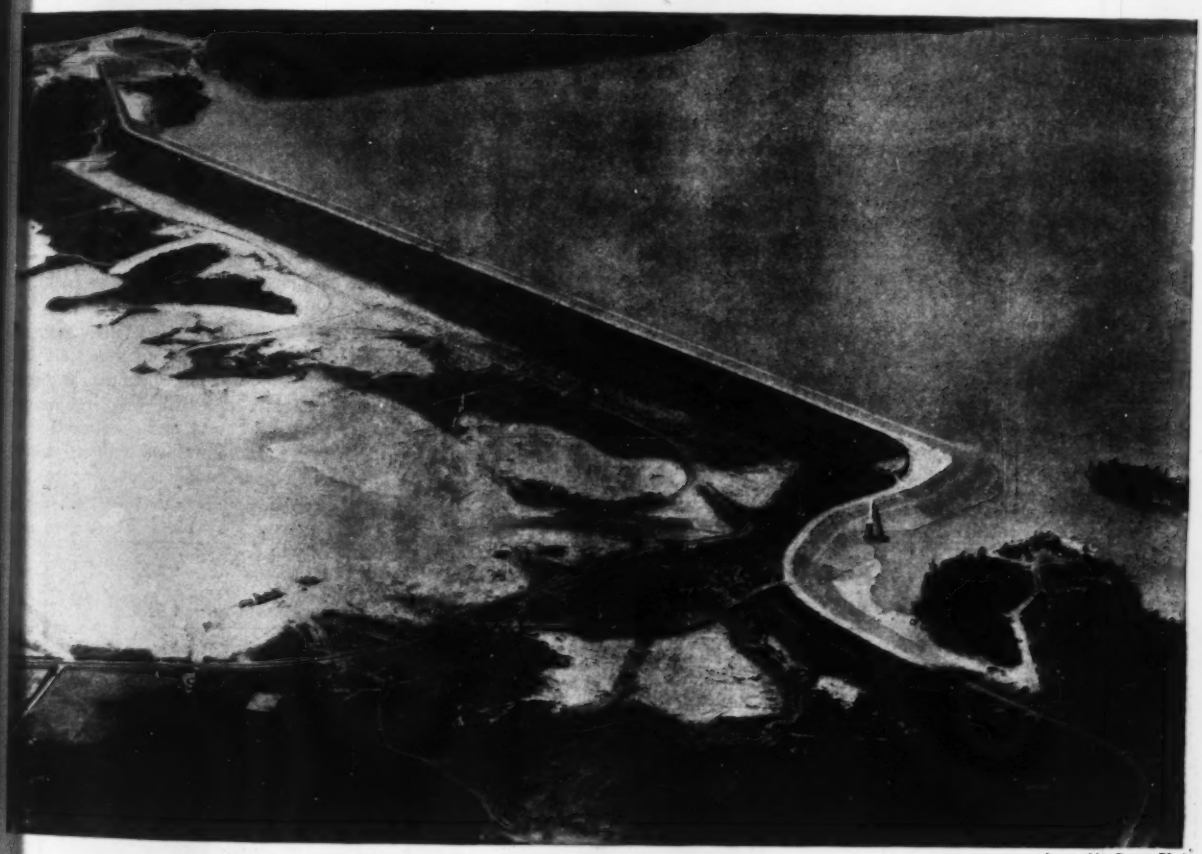
The merger of the two schools will give Chicago one of the largest and best equipped technical colleges in the United States. Endowment funds of the Armour and Lewis Institute total more than $2,000,000, and the proposed budget for the new institute provides for an expenditure of $1,250,000 a year for education and research.

Henry T. Heald

According to an announcement by Heald, the coming school year will serve as a transition period and there will be no shakeup of the two faculties. All upper class engineering courses will be taught at Armour institute, and preliminary and liberal arts subjects will be given on the Lewis campus. Officials of the new institution hope that eventually a new plant can be built somewhere in downtown Chicago.

Armour Institute was founded in 1892 by Philip D. Armour, Chicago packer, and Lewis Institute was endowed by Allan C. Lewis in 1877 and the institute was opened in 1896.

Heald is a graduate of the State College of Washington of the class of 1923 and of the University of Illinois in 1925. He joined Armour Institute as assistant professor of civil engineering in 1927 after serving as junior engineer for the U. S. Bureau of Reclamation at Pendleton, Ore., as a designer for the bridge department of the Illinois Central and as structural engineer for the Chicago Board of Local Improvements.



Army Air Corps Photo

Sardis Dam in Mississippi dedicated

With several thousand spectators present, Sardis Dam was dedicated Aug. 8 by the U. S. Engineers. Located 10 miles southeast of Sardis, Miss. on the Little Tallahatchie River, the dam will afford protection to 3,000,000 acres of rich lowlands. The reservoir, which is shown with water at El. 248.45 (dam crest El. 312) or 131/2 ft. above conservation pool level, will create a lake with a maximum area of 90 sq.mi. Costing about $15,000,000, the dam is part of the flood-control system for the delta region of the lower Mississippi valley.

The dam and abutment dikes are about 14,500 ft. long with a maximum height above river bed of 117 ft. A total of 16,800,000 cu.yd. of fill, of which 13,900,000 cu.yd. was placed by the hydraulic method, was required (ENR, Dec. 7, 1939, p. 741). In the view shown above the spillway is in the left background while the outlet structures through the dam are in the right foreground.

CONTRACT UNIT PRICES

What contractors are bidding on different kinds of construction work

FORT SUPPLY DAM
OKLAHOMA

OWNER: U. S. Engineer Office, Tulsa, Okla.

PROJECT: Completion of Fort Supply Dam for flood control on Wolf Creek near Supply, Woodward County, Okla. Involves construction of spillway and completion of embankment and outlet works. Major features include: diversion and care of water, including necessary cofferdams; excavation to final grade for spillway, drainage and key trenches, approach and outlet channels; backfill around concrete structures; completion of rolled earth dam and redressing slopes of embankment and placing protection stone; drainage work; concrete for spillway and completion of gate tower; gates and machinery installation; and water, gas, power and light supplies.

CONDITIONS: Sand conditions at dam site are bad. Stream is ordinarily dry, but subject to flash floods. This is last contract on job. Previous contracts have been let in 1938 and 1939 and are now completed. Absorptive form lining is to be used for outer walls of gate tower above El. 2025; for gate tower superstructure above El. 2059.5; for vertical surfaces of curbs of concrete deck of service bridge; for concrete pylons on service bridge abutment. Government to furnish all cement; contractor to furnish all other materials. Rail and highway transportation facilities available. To be completed in 800 calendar days. Wages are: skilled labor, $1.00 to $1.35 per hr.; semi-skilled, 75c.; and common labor 40c. per hr.

BIDS: Seven bids were received June 27, 1940, ranging from the contract low of $2,920,666 to $3,983,030. Engineer's estimate, $3,420,764.

LIST OF BIDDERS:

1. Lee Sanders, Oklahoma City, Okla. (contract) $2,920,666
2. Morrison-Knudsen Co., Inc., Los Angeles, Calif. 3,258,421
3. The Massman Constr. Co., Kansas City, Mo. 3,273,313
4. Winston Bros. Co., & Missouri Valley Bridge and Iron Co., Leavenworth, Kan. 3,369,950
5. Mittry Bros. Constr. Co., Los Angeles, Calif. 3,422,232
6. Western Contracting Corp., Sioux City, Iowa 3,741,321
7. W. E. Callahan Constr. Co., Dallas, Tex. 3,983,030

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Cofferdam	L.S.	$100,000.00	$100,000.00	$150,000.00
2. Redress slopes of earth fill constr. under previous contract, before receiving protective covering	33,000 sq.	.50	.10	.50
3. Excav., embankment foundn.	97,000 c.y.	.25	.80	.40
4. Excav., unclassified	1,290,000 c.y.	.25	.26	.42
5. Excavation, special	17,500 c.y.	1.50	1.60	1.00
6. Trench excavation	13,400 c.y.	1.50	3.00	1.00
7. Excav., Borrow Area A	52,000 c.y.	.20	.25	.20
8. Excav., Borrow Area B	414,000 c.y.	.20	.28	.20
9. Excav., Borrow Area C	121,000 c.y.	.25	.24	.21
10. Excavation, stock piles	130,000 c.y.	.16	.15	.18
11. Topsoil	8,500 c.y.	.50	.32	.10
12. Foundation protection	1,300 sq.	2.50	1.90	2.00
13. Impervious fill	1,055,000 c.y.	.065	.09	.10
14. Pervious fill	535,000 c.y.	.045	.07	.08
15. Roll; add'l. 2 passes	100,000 sq.	.01	.01	.03
16. Structure backfill	50,000 c.y.	.35	1.00	.40
17. Fine sand in filter	5,300 c.y.	3.00	1.75	3.00
18. Coarse sand in filter	3,000 c.y.	4.50	3.00	4.00
19. Fine gravel in filter	4,300 c.y.	4.00	4.50	5.00
20. Coarse gravel in filter	1,350 c.y.	4.00	4.50	5.00
21. Gravel on dam	72,400 c.y.	4.50	3.80	4.50
22. Grav., downstream toe drain	7,300 c.y.	4.00	3.80	4.00
23. Gravel in drains	4,200 c.y.	4.50	4.30	5.00
24. Gravel, walks and roadway	34,200 s.y.	.60	.80	1.00
25. Riprap toe; dumped	5,500 c.y.	3.80	4.00	4.00
26. Riprap; hand-placed	84,300 c.y.	6.00	6.00	5.50
27. Derrick stone	8,400 c.y.	6.00	7.35	4.00
28. Rock gutters	5,100 s.y.	1.00	1.80	2.50
29. Concrete, Class A	2,700 c.y.	12.45	18.50	15.00
30. Concrete, Class B	94,300 c.y.	7.50	9.00	7.50
31. Haul and store cement	110,400 bbl.	.05	.13	.15
32. Reinforcing steel	3,600,000 lb.	.04	.043	.045
33. Copper water stops	1,340 lb.	.50	.55	
34. Struct. steel, service brdge	135,400 lb.	.08	.09	
35. Misc. metal work	113,000 lb.	.15	.17	
36. Misc. brass and bronze	750 lb.	1.00	2.20	
37. Misc. cast iron pipe	30,100 lb.	.10	.11	
38. Misc. black steel pipe	9,300 lb.	.10	.12	
39. Misc. wrought iron pipe	16,000 lb.	.25	.17	
40. 24-in. corr. metal pipe	600 l.f.	7.00	6.00	
41. 42-in corr. metal pipe	1,292 l.f.	10.00	9.75	
42. Corr. metal manholes (4)	L.S.	2,600.00	2,700.00	2,600.00
43. 6-in. vitr. clay pipe	8,200 l.f.	.30	.33	
44. 12-in vitr. clay pipe	2,200 l.f.	.75	.85	
45. 18-in. vitr. clay pipe	22 l.f.	2.00	2.00	
46. 30-in. vitr. clay pipe	60 l.f.	4.50	6.50	
47. 24-in. vitr. clay split pipe	900 l.f.	2.00	2.16	
48. 30-in. vitr. clay split pipe	50 l.f.	3.00	3.30	
49. Handrailing	12,400 lb.	.30	.27	
50. Gates, conduit linings, hoists	L.S.	85,000.00	92,500.00	85,000.00
51. Gasoline-elect. stand-by unit	L.S.	3,250.00	3,800.00	3,500.00
52. Traveling crane	L.S.	8,000.00	10,800.00	9,500.00
53. 36-in. gate valves (2)	L.S.	2,500.00	3,800.00	2,500.00
54. 6-in. flap valves, complete	2 ea.	50.00	55.00	400.00
55. Monorail chain hoist	L.S.	250.00	325.00	300.00
56. Conduit; rigid metal	21,600 lb.	.15	.16	.16
57. Power and lighting system	L.S.	10,000.00	12,000.00	20,000.00
58. Gate tower superstructure	L.S.	20,000.00	19,500.00	15,000.00
59. Raw-water pump and pressure tank	L.S.	750.00	650.00	750.00
60. Sump pump, complete	L.S.	500.00	650.00	750.00
61. Trash rack hoist	L.S.	900.00	1,100.00	1,000.00
62. Highway guard rail	22,430 l.f.	.50	.80	1.00
63. Stock pile; gravel on dam	1,000 c.y.	4.50	3.80	4.00
64. Stock pile; hand-placed riprap	2,000 c.y.	6.00	4.32	4.00

HIGHWAYS
SASKATCHEWAN, CANADA

OWNER: Dept. of Highways and Transportation, Government of Saskatchewan, Can. W. W. Perrie, Regina, Sask., engineer.

PROJECT: Constructing of portion of asphaltic bituminous highway from Regina to Pense. About 16 miles in length. Roadway 21-ft. wide.

CONDITIONS: Rail and highway transportation available. Contractor to furnish all materials and complete work in 3 months. Wages stipulated are: skilled, 75c. per hr.; semi-skilled, 60c.; and common, 40c. per hr. War requirements in Canada have increased material costs, and enlistments which were very heavy in Western Canada have reduced usually available labor. This does not mean an actual shortage, but that few younger men are on hand.

BIDS: Six bids were received May 22, 1940, ranging from the contract low of $271,335 to $370,982.

LIST OF BIDDERS:

1. Fred Mannix, Calgary, Alta., (contract) $271,335
2. W. C. Wells, Wilkie, Sask. 281,700
3. Evans Gravel Surfacing Co., Ltd., Saskatoon, Sask. 295,602
4. Carter-Hall-Aldinger, Ltd., Regina, Sask. 307,300
5. Gibbs Brothers, Lumsden, Sask. 322,840
6. J. Dutton & R. Paget, Winnipeg, Man. 370,982

Item	Quan.	Unit Prices (1)	(2)	(3)
1. Excavation	395,000 c. y.	$0.115	$0.105	$0.2
2. Overhaul	266,000 c. y. sta.	.0025	.02	.0
3. 18-in. corr. iron pipe culv., instal	150 l. f.	.15	.20	.3
4. 24-in. corr. iron pipe culv., instal	1,292 l. f.	.15	.25	.1
5. 36-in. corr. iron pipe culv., instal	884 l. f.	.20	.25	.2
6. 48-in. corr. iron pipe culv., instal	64 l. f.	.25	.40	.1
7. Inst. 18-in. conc. pipe culv.	420 l. f.	.30	.35	.1
8. Inst. 24-in. conc. pipe culv.	180 l. f.	.40	.50	.1
9. Timber culverts	47.6 M bm.	10.00	15.00	20.0
10. Remove corr. iron pipe culv.	550 l. f.	.20	.25	.0
11. Remove conc. pipe culv.	1,450 l. f.	.25	.35	.0
12. Remove timber culvert	1,100 l. f.	.75	.25	.0
13. Construction of guard rail	1,400 l. f.	.20	.15	.0
14. Guard rail anchors	4 ea.	3.00	2.00	1.0
15. Guard rail dummy posts	8 ea.	.30	.50	.0
16. Supplying water	M gal.	10.00	5.00	20.0
17. Supplying riprap	188 c. y.	1.75	1.50	1.0
18. Overhaul on riprap	1,600 c.y. mi.	.15	.00	.0
19. Stabilized base	96,700 ton	1.65	1.65	1.0
20. Bitum. surface course	29,600 ton	1.78	2.25	1.0
21. Seal coat	225,280 s. y.	.042	.025	.0